Grade 8 : Embedded Inquiry

Conceptual Strand

Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.

Guiding Question

What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
GLE 0807.Inq.1 Design and conduct open-ended scientific investigations. **GLE 0807.Inq.2** Use appropriate tools and techniques to gather, organize, analyze, and interpret data. **GLE 0807.Inq.3** Synthesize information to determine cause and effect relationships between evidence and explanations. **GLE 0807.Inq.4** Recognize possible sources of bias and error, alternative explanations, and questions for further exploration. **GLE 0807.Inq.5** Communicate scientific understanding using descriptions, explanations, and models.	✓**0807.Inq.1** Design and conduct an open-ended scientific investigation to answer a question that includes a control and appropriate variables. ✓**0807.Inq.2** Identify tools and techniques needed to gather, organize, analyze, and interpret data collected from a moderately complex scientific investigation. ✓**0807.Inq.3** Use evidence from a dataset to determine cause and effect relationships that explain a phenomenon. ✓**0807.Inq.4** Review an experimental design to determine possible sources of bias or error, state alternative explanations, and identify questions	**SPI 0807.Inq.1** Design a simple experimental procedure with an identified control and appropriate variables. **SPI 0807.Inq.2** Select tools and procedures needed to conduct a moderately complex experiment. **SPI 0807.Inq.3** Interpret and translate data into a table, graph, or diagram. **SPI 0807.Inq.4** Draw a conclusion that establishes a cause and effect relationship supported by evidence. **SPI 0807.Inq.5** Identify a faulty interpretation of data that is due to bias or experimental error.

	for further investigation. ✓**0807.Inq.5** Design a method to explain the results of an investigation using descriptions, explanations, or models.	

Grade 8 : Embedded Technology & Engineering

Conceptual Strand

Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.

Guiding Question

How do science concepts, engineering skills, and applications of technology improve the quality of life?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
GLE 0807.T/E.1 Explore how technology responds to social, political, and economic needs. **GLE 0807.T/E.2** Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting. **GLE 0807.T/E.3** Compare the intended benefits with the unintended consequences of a new	✓**0807.T/E.1** Use appropriate tools to test for strength, hardness, and flexibility of materials. ✓**7707.T/E.2** Apply the engineering design process to construct a prototype that meets certain specifications. ✓**0807.T/E.3** Explore how the unintended consequences of new technologies can impact society.	**SPI 0807.T/E.1** Identify the tools and procedures needed to test the design features of a prototype. **SPI 0807.T/E.2** Evaluate a protocol to determine if the engineering design process was successfully applied. **SPI 0807.T/E.3** Distinguish between the intended benefits and the unintended consequences of a new technology.

technology. **GLE 0807.T/E.4** Describe and explain adaptive and assistive bioengineered products.	✓**0807.T/E.4** Research bioengineering technologies that advance health and contribute to improvements in our daily lives. ✓**0807.T/E.5** Develop an adaptive design and test its effectiveness.	**SPI 0807.T/E.4** Differentiate between adaptive and assistive bioengineered products (e.g., food, biofuels, medicines, integrated pest management).

Grade 8 - Life Science

Grade 8 : Standard 1 - Cells

Conceptual Strand 1

All living things are made of cells that perform functions necessary for life.

Guiding Question 1

How are plant and animals cells organized to carry on the processes of life?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

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Grade 8 : Standard 2 - Interdependence

Conceptual Strand 2

All life is interdependent and interacts with the environment.

Guiding Question 2

How do living things interact with one another and with the non-living elements of their environment?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 7 : Standard 3 - Flow of Matter and Energy

Conceptual Strand 3

Matter and energy flow through the biosphere.

Guiding Question 3

What scientific information explains how matter and energy flow through the biosphere?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 8 : Standard 4 - Heredity

Conceptual Strand 4

Plants and animals reproduce and transmit hereditary information between generations.

Guiding Question 4

What are the principal mechanisms by which living things reproduce and transmit information between parents and offspring?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 8 : Standard 5 - Biodiversity and Change

Conceptual Strand 5

A rich variety of complex organisms have developed in response to a continually changing environment.

Guiding Question 5

How does natural selection explain how organisms have changed over time?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
GLE 0807.5.1 Identify various criteria used to classify organisms into groups.	✓**0807.5.1** Select characteristics of plants and animals that serve as the basis for developing	**SPI 0807.5.1** Use a simple classification key to identify an unknown organism..

GLE 0807.5.2 Use a simple classification key to identify a specific organism. **GLE 0807.5.3** Analyze how structural, behavioral, and physiological adaptations within a population enable it to survive in a given environment. **GLE 0807.5.4** Explain why variation within a population can enhance the chances for group survival. **GLE 0807.5.5** Describe the importance of maintaining the earth's biodiversity. **GLE 0807.5.6** Investigate fossils in sedimentary rock layers to gather evidence of changing life forms.	a classification key. ✓**0807.5.2** Create and apply a simple classification key to identify an organism. ✓**0807.5.3** Compare and contrast the ability of an organism to survive under different environmental conditions. ✓**0807.5.4** Collect and analyze data relating to variation within a population of organisms. ✓**0807.5.5** Prepare a poster that illustrates the major factors responsible for reducing the amount of global biodiversity. ✓**0807.5.6** Prepare graphs that demonstrate how the amount of biodiversity has changed in a particular continent or biome. ✓**0807.5.7** Create a timeline that illustrates the relative ages of fossils in sedimentary rock layers.	**SPI 0807.5.2** Analyze structural, behavioral, and physiological adaptations to predict which populations are likely to survive in a particular environment **SPI 0807.5.3** Analyze data on levels of variation within a population to make predictions about survival under particular environmental conditions. **SPI 0807.5.4** Identify several reasons for the importance of maintaining the earth's biodiversity. **SPI 0807.5.5** Compare fossils found in sedimentary rock to determine their relative age.

Grade 8 - Earth and Space Science

Grade 8 : Standard 6 - The Universe

Conceptual Strand 6

The cosmos is vast and explored well enough to know its basic structure and operational principles.

Guiding Question 6

What big ideas guide human understanding about the origin and structure of the universe, Earth's place in the cosmos, and observable motions and patterns in the sky?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 8 : Standard 7 – The Earth

Conceptual Strand 7

Major geologic events that occur over eons or brief moments in time continually shape and reshape the surface of the Earth, resulting in continuous global change.

Guiding Question 7

How is the earth affected by long-term and short term geological cycles and the influence of man?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 8 : Standard 8 - The Atmosphere

Conceptual Strand 8

The earth is surrounded by an active atmosphere and an energy system that controls the distribution life, local weather, climate, and global temperature.

Guiding Question 8

How do the physical characteristics and the chemical makeup of the atmosphere influence surface processes and life on Earth?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 8 - Physical Science

Grade 8 : Standard 9 - Matter

Conceptual Strand 9

The composition and structure of matter is known, and it behaves according to principles that are generally understood.

Guiding Question 9

How does the structure of matter influence its physical and chemical behavior?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
GLE 0807.9.1 Understand that all matter is made up of atoms. **GLE 0807.9.2** Explain that matter has properties that are determined by the structure and arrangement of its atoms. **GLE 0807.9.3** Interpret data from an investigation to differentiate between physical and chemical changes. **GLE 0807.9.4** Distinguish among elements, compounds, and mixtures. **GLE 0807.9.5** Apply the chemical properties of the atmosphere to illustrate a mixture of gases. **GLE 0807.9.6** Use the periodic table to determine the characteristics of an element. **GLE 0807.9.7** Explain the Law of Conservation of Mass. **GLE 0807.9.8** Interpret the events represented by a chemical equation. **GLE 0807.9.9** Explain the basic difference	✓**0807.9.1** Identify atoms as the fundamental particles that make up matter. ✓**0807.9.2** Illustrate the particle arrangement and type of motion associated with different states of matter. ✓**0807.9.3** Measure or calculate the mass, volume, and temperature of a given substance. ✓**0807.9.4** Calculate the density of various objects. ✓**0807.9.5** Distinguish between elements and compounds by their symbols and formulas. ✓**0807.9.6** Differentiate between physical and chemical changes. ✓**0807.9.7** Describe how the characteristics of a compound are different than the characteristics of their component parts. ✓**0807.9.8** Determine the types of interactions between substances that result in a chemical change.	**SPI 0807.9.1** Recognize that all matter consists of atoms. **SPI 0807.9.2** Identify the common outcome of all chemical changes. **SPI 0807.9.3** Classify common substances as elements or compounds based on their symbols or formulas. **SPI 0807.9.4** Differentiate between a mixture and a compound. **SPI 0807.9.5** Describe the chemical makeup of the atmosphere. **SPI 0807.9.6** Compare the particle arrangement and type of particle motion associated with different states of matter. **SPI 0807.9.7** Apply an equation to determine the density of an object based on its mass and volume. **SPI 0807.9.8** Interpret the results of an investigation to determine whether a physical or chemical change has occurred.

between acids and bases.	✓**0807.9.9** Explain how the chemical makeup of the atmosphere illustrates a mixture of gases. ✓**0807.9.10** Identify the atomic number, atomic mass, number of protons, neutrons, and electrons in an atom of an element using the periodic table. ✓**0807.9.11** Use investigations of chemical and physical changes to describe the Law of Conservation of Mass. ✓**0807.9.12** Differentiate between the reactants and products of a chemical equation. ✓**0807.9.13** Determine whether a substance is an acid or a base by its reaction to an indicator.	**SPI 0807.9.9** Use the periodic table to determine the properties of an element. **SPI 0807.9.10** Identify the reactants and products of a chemical reaction. **SPI 0807.9.11** Recognize that in a chemical reaction the mass of the reactants is equal to the mass of the products (Law of Conservation of Mass). **SPI 0807.9.12** Identify the basic properties of acids and bases.

Grade 8 : Standard 10 - Energy

Conceptual Strand 10

Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.

Guiding Question 10

What basic energy related ideas are essential for understanding the dependency of the natural and man-made worlds on energy?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 7 : Standard 11 - Motion

Conceptual Strand 11

Objects move in ways that can be observed, described, predicted, and measured.

Guiding Question 11

What causes objects to move differently under different circumstances?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	**(NOT ADDRESSED AT THIS GRADE LEVEL)**	**(NOT ADDRESSED AT THIS GRADE LEVEL)**

Grade 8 : Standard 12 - Forces in Nature

Conceptual Strand 12

Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.

Guiding Question 12

What are the scientific principles that explain gravity and electromagnetism?

Grade Level Expectations	Checks for Understanding	State Performance Indicators
GLE 0807.12.1 Investigate the relationship between magnetism and electricity. **GLE 0807.12.2** Design an investigation to change the strength of an electromagnet. **GLE 0807.12.3** Compare and contrast the earth's magnetic field to that of a magnet and an electromagnet. **GLE 0807.12.4** Identify factors that influence the amount of gravitational force between objects. **GLE 0807.12.5** Recognize that gravity is the force that controls the motion of objects in the solar system.	✓**0807.12.1** Create a diagram to explain the relationship between electricity and magnetism**.** ✓**0807.12.2** Produce an electromagnet using a bar magnet and a wire coil. ✓**0807.12.3** Experiment with an electromagnet to determine how to vary its strength. ✓**0807.12.4** Create a chart to distinguish among the earth's magnetic field, and fields that surround a magnet and an electromagnet. ✓**0807.12.5** Explain the difference between mass and weight. ✓**0807.12.6** Identify factors that influence the amount of gravitational force between objects. ✓**0807.12.7** Explain how the motion of objects in the solar system is affected by gravity.	**SPI 0807.12.1** Recognize that electricity can be produced using a magnet and wire coil. **SPI 0807.12.2** Describe the basic principles of an electromagnet. **SPI 0807.12.3** Distinguish among the Earth's magnetic field, a magnet, and the fields that surround a magnet and an electromagnet. **SPI 0807.12.4** Distinguish between mass and weight using appropriate measuring instruments and units. **SPI 0807.12.5** Determine the relationship among the mass of objects, the distance between these objects, and the amount of gravitational attraction. **SPI 0807.12.6** Illustrate how gravity controls the motion of objects in the solar system.